10-04-00 A

PATENT APPLICATION
Docket No.: 28170-00023
141635/ØS/KR

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of: Espen SKJÆRAN et al.

For: REDUCING SIGNALLING IN AN H.323 NETWORK BY ARRANGING GATEKEEPERS HIERARCHICALLY

CERTIFICATE OF MAILING BY EXPRESS MAIL

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Marty Balko
Signature

BOX PATENT APPLICATION
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Sir:

PATENT APPLICATION TRANSMITTAL LETTER

Transmitted herewith for filing, please find the following:

1. (XX) The specification of the above-referenced patent application is enclosed herewith (9 page(s) including claim(s) and Abstract).

2. (XX) Six (6) sheet(s) of:
___ informal drawing(s) is (are) enclosed herewith.
X formal drawing(s) is (are) enclosed herewith.

3. (X) The fees for this application have been calculated and included as shown below (Prior to calculating the fees, please enter any enclosed preliminary amendment.):

	NO. FILED	NO. EXTRA	RATE	FEE
BASIC FEE				**$710**
TOTAL CLAIMS	**3-20**	**0**	**$18**	**0**
INDEPENDENT CLAIMS	**1-3**	**0**	**$80**	**0**
MULTIPLE DEPENDENT CLAIM(S) PRESENTED			**$270**	
TOTAL FEES:				**$710.00**
Deduct One-Half for Small Entity Status				
Assignment Recordal Fee			**$40**	
TOTAL AMOUNT DUE:				**$710.00**

4. __X__ A check in the amount of $ 710.00 is enclosed herewith. Please charge any deficiency or credit any overpayment to Deposit Account No. 10-0447 .

___ Please charge my Deposit Account No. _____ in the amount of $_____. Please charge any deficiency or credit any overpayment to Deposit Account No. _____.

5. (X) An oath or declaration is enclosed herewith that is:

__X__ Unsigned

___ Newly executed per 37 CFR 1.63(a) and (b).

___ A copy of the executed declaration filed in the prior application upon which priority is based, showing the signature or an indication thereon that it was signed; and:

___ This application is being filed fewer than all of the inventors named in the prior application and it is requested that the following name or names be deleted from the list of inventors in the prior application for this continuation or divisional application:

_____

_____.

___ The prior application was accorded status under 37 CFR § 1.47 and is accompanied by:

___ A copy of the decision granting a petition to accord Sec. 1.47 status to the prior application (unless all of the inventors have or legal representatives have filed an oath or declaration to join in the prior application).

___ A copy of the subsequently executed oath(s) or declaration(s) filed by the inventor(s) or legal representative(s) that have subsequently joined in the prior application.

6. (X) The power of attorney for this application:

___ is appointed in the newly executed Oath or Declaration submitted herewith.

_X_ is appointed by the power of attorney enclosed herewith.

___ remains the same as originally in the parent application.

___ was changed during the prosecution of the parent application and a copy of the change in the power of attorney is enclosed herewith.

7. (XX) The correspondence address for this application shall be:

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_X_ which is a new correspondence address or a change therein.

___ which is the same as originally in the parent application.

___ which is the change in the correspondence address that was filed during the prosecution of the parent application.

8. (X) Priority is hereby claimed under 35 USC 119 and 172 to the following foreign applications:

Country	Serial No.	Date
Norway	19994828	4 October 1999

and:

___ A certified copy of each application is enclosed herewith.

___ A certified copy of each application was filed in prior application Serial No. _____.

9. ( ) A verified statement claiming small entity status under 37 CFR 1.9 and 1.27:

___ is enclosed herewith.

___ was filed in parent application Serial No. _____, and such status remains unchanged and is requested for this application.

10. ( ) A preliminary amendment is enclosed herewith.

11. ( ) An Information Disclosure Statement with Modified PTO Form 1449 and a copy of the cited references are enclosed herewith.

12. ( ) An Assignment of the invention to TELEFONAKTIEBOLAGET LM ERICSSON (publ) with cover sheet and recordation fee is enclosed herewith for recordation by the Assignment Branch.

13. (XX) The Commissioner is hereby authorized to charge payment, or to credit any overpayment, of the following fees associated with this filing or during the pendency of this application to Deposit Account No. 10-0447.

X Any patent application filing fees under 37 CFR 1.16.
X Any patent application processing fees under 37 CFR 1.17.
___ The issue fee under 37 CFR 1.18 at or before mailing of the Notice of Allowance, pursuant to 37 CFR 1.311(b).

14. ( ) Other (specify):_____

_____

_____.

15. (XX) Confirmation Postcard.

Respectfully submitted,

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REDUCING SIGNALLING IN AN H.323 NETWORK BY ARRANGING GATEKEEPERS HIERARCHICALLY

TECHNICAL FIELD

The patent application applies to the field of Internet telephony, and in particular relates to the distribution of gatekeepers in a H.323 network.

THE PROBLEM AREAS

Voice telephony (non-IP) is based on an architecture of switches interconnected via fixed lines. A call from a calling party to a called party is routed between the switches based on number analysis. That is, the local switch of the caller analyses the dialled number as to land and trunk code prefixes, and routes the call to the switch serving the called party.

In modern multimedia telephony, comprising distributed gatekeepers in a H.323 network, there exist no similar mechanism based on number analysis for routing of calls. The technology of multimedia telephony originates from local area network environments, where elaborate routing schemes are regarded as unnecessary, instead relying on a peer-to-peer relationship between the gatekeepers.

Thus today H.323 requires a full mesh of gatekeeper knowledge before calls can be routed between these (All gatekeepers has to know all gatekeepers for calling to all users), or the use of multicast which has the same applications. Before setting up a call to a non-local user, the originating gatekeeper has to send a Location Request message to all the other gatekeepers for finding the address of the user. This is illustrated in figure 1, where GK1 when receiving a call from User A, must send Location Request to all the other gatekeepers to locate User B.

This situation scales very badly in a large H.323 network, as up to a point, all gatekeepers will spend most of their capacity processing and replying Location Requests from other gatekeepers. Figure 3 (multicast) and figure 4 (unicast) presents the sequence diagrams for locating a user today.

However, hierarchical routing as such is known from some other network systems.

The document RFC 1887 (http://sunsite.auc.dk)describes the use of prefixes for hierarchical routing in IP ver.6. Routing is performed on a network level.

WO 97/02689 describes how data in network layer packets can be added or changed to extend the address field. However, this is strictly speaking not hierarchical routing, as the source router must know the destination.

US patent 5,982,869 describes a method for automatic generation of routing tables from network topology. The tables are unique for each switch in a hierarchical network. The point is to optimalize by automatic configuration in a hierarchical network for international traffic.

US patent 5,940,369 relates to a method for routing and automatic configuration in ATM networks. The nodes are arranged in á hierarchical fashion. However, this patent relates to specific problems in ATM networks which can be solved by an hierarchical organisation of the nodes.

THE INVENTION

OBJECTS OF THE INVENTION

An object of the invention is to provide an arrangement in an H.323 network that allow localisation of the parties using less message exchange between the gatekeepers and thus easing the load on each gatekeeper. This results in a faster connection process.

BRIEF SUMMARY OF THE INVENTION

The above object are achieved in an arrangement according to the invention, where the gatekeepers are organised hierarchical for routing/user location, as stated in the appended patent claims.

In an arrangement according to the invention the load of processing the Location Request is spread to fewer gatekeepers, which is a big advantage in a large H.323 network.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 shows a H.323 network as it is structured today.

Figure 2 shows an hierarchical organisation of gatekeepers in an H.323 network according to the invention, where calls are routed according to an embodiment of the invention using numbering plans.

Figure 3 shows locating of User-B in Figure 1 using multicast LRQ (prior art).

Figure 4 shows location of User-B using unicast LRQ (prior art).

Figure 5 shows location of User-B using LRQ in an H.323 network comprising gatekeepers organised according to the invention.

Figure 6 shows location of User-B using numbering plans in an H.323 network organised according to the invention.

DESCRIPTION OF SOLUTION

Reference is made to Fig. 1 which shows a situation in a H.323 network of today. The network comprises a mesh of interconnected gatekeepers GK1 to GKn. Each gatekeeper is connected to a number of users. Each individual gatekeeper knows the identity of all users that are directly connected to it, but has no knowledge of the users that are connected to the other gatekeepers. However, the gatekeepers know all other gatekeepers.

In the situation depicted an User A, connected to GK1 tries to make a call to User B, who is connected to GK4. In order to route the call to User B, GK1 first has to locate User B. This may be performed either in a multicast process or in a unicast process.

Fig. 3 shows the signalling sequence taking place in a multicast scenario. At top, left, User A issues a set-up message which is received at GK1. To locate User B, GK1 transmits a Locate Request (LRQ) message to all the other gatekeepers in the network. In this instance GK4 recognises that the wanted User B is a member of its group of connected users, and answers the LRQ(B) message by transmitting a Locate Confirm (LCF) message back to GK1. GK1 then send a Set-up (B) message to GK4, which is then forwarded to User B.

Fig. 4 shows the alternative steep procedure using an unicast algorithm. Again User A issues a Set-up(B) message which is received at GK1. GK1 now asks the other gatekeepers sequentially if they have an User B connected. First the LRQ(B) message is sent to GK2. GK2 answers that User B is not in its domain by issuing a Locate Reject (LRJ) message. GK1 repeats the process with other gatekeepers until one of the gatekeepers answers with a LCF(B) message, stating that User B is one of its connected users. GK1 then sends a Set-up message to GK4, which forwards the message further to User B.

Fig. 2 gives an example of the new organisation of the gatekeepers according to the invention. In terms of routing, the gatekeepers are organised hierarchically, in "lower" and "higher" gatekeepers. Each gatekeeper knows one higher level gatekeeper (if it is not the "top" node) and a number of lower level gatekeepers (if it isn't the "bottom" node).

A lower level gatekeeper knows its higher level gatekeeper, and assumes it knows a wider address space than itself. After its own user location algorithm is performed with no success (no address found locally or in lower level gatekeepers), it forwards the call to its higher level gatekeeper. This can be done either with a Location Request directly to this, or sending the SET-UP message directly, if it knows this gatekeeper support routing of the call signalling channel, thus saving two message exchanges.

The higher level gatekeeper now tries to locate the user with its own location algorithm. If the called user is not locally registered, it might send Location Request messages to its lower level gatekeepers (minus the one originating the message) as illustrated in figure 5, or it can have some knowledge of the address spaces of its lower level gatekeepers. In the last case, the Location Request is sent the gatekeeper with the matching address space, or the SET-UP can be sent directly, if it knows this gatekeeper support routing of the call signalling channel.

This scheme could also be used for "hybrid" networks, by letting the gatekeepers know of some peer gatekeepers used in the location algorithm.

REFERENCES

ITU-T Recommendation H.323 (1996) "Visual Telephone Systems and Equipment for Local Area Networks which provide a non-guaranteed Quality of Service"

Patent claims

1. Arrangement in a H.323 network comprising a number of gatekeepers which each are connected to a number of users, characterized in that the gatekeepers are arranged hierarchically in the sense that each gatekeeper knows a higher level gatekeeper (except the "top" node) and a number of lower level gatekeepers (except the "bottom" nodes).

2. Method for establishing a connection between a calling party and a called party in a H.323 network arranged according to claim 1,
characterized in that the calling user issues a Set-up command which is received by a connected first gatekeeper,
said first gatekeeper performs a user location algorithm on its locally attached users,
if this algorithm fails, said first gatekeeper send a Location Request message to its lower level gatekeepers, each lower level gatekeeper perform an user location algorithm on its attached users and lower level gatekeepers,
if these user location algorithms fail, said first gatekeeper send a Location Request message to its higher level gatekeeper, which performs an user location algorithm on its attached users and gatekeepers except the originating gatekeeper,
if one of the user location algorithms succeed, the gatekeeper concerned sends a Location Confirm message to the first gatekeeper,
the first gatekeeper sends a Set-up message to the gatekeeper which has issued the Location Confirm message, which gatekeeper forwards said Set-up message to the called user, whereupon said connection is established.

3. Method for establishing a connection between a calling party and a called party in a H.323 network arranged according to claim 1,

c h a r a c t e r i z e d i n that the calling user issues a Set-up command which is received by a connected first gatekeeper,

said first gatekeeper performs a user location algorithm on its locally attached users and lower level gatekeepers,

if this user location algorithm fail, said first gatekeeper forwards the call to its higher level gatekeeper, which performs an user location algorithm on its attached users and gatekeepers except the originating gatekeeper,

if one of the user location algorithms succeed, said higher level gatekeeper forwards said Setup message to the called user, whereupon said connection is established.

Abstract

The invention relates to Internet telephony, and in particular an arrangement of gatekeepers in a H.323 network to reduce signalling during call set-up procedures. This is achieved by arranging the gatekeepers hierarchically, that is each gatekeeper knows a number of lower level gatekeepers (except the "bottom" nodes) and a higher level gatekeeper (except the "top" node). During set-up of a call, the gatekeeper connected to the calling user performs a user location algorithm on its attached users and lower level gatekeepers. If this procedure fails, it will proceed to its higher level gatekeeper.

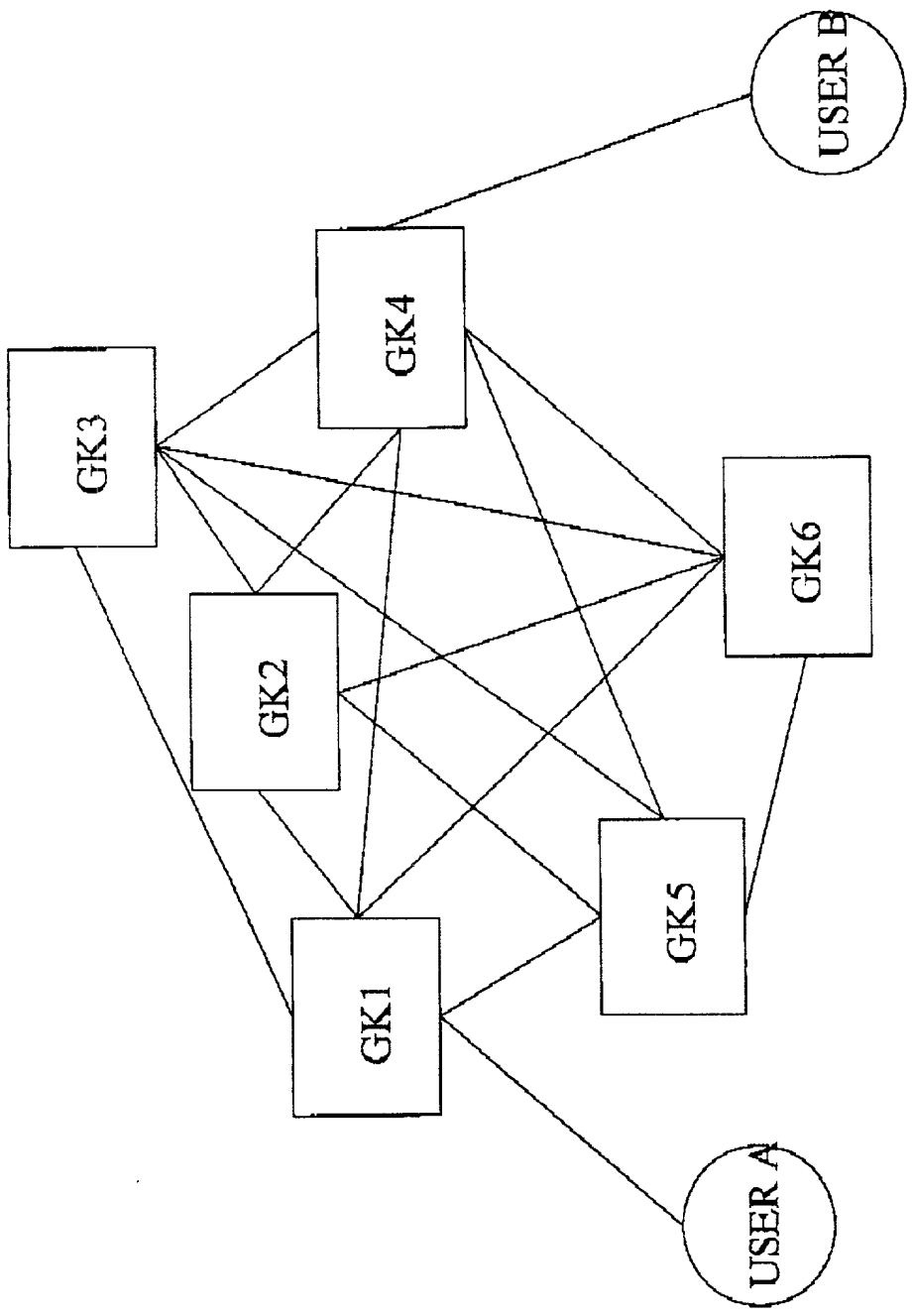


Figure 1

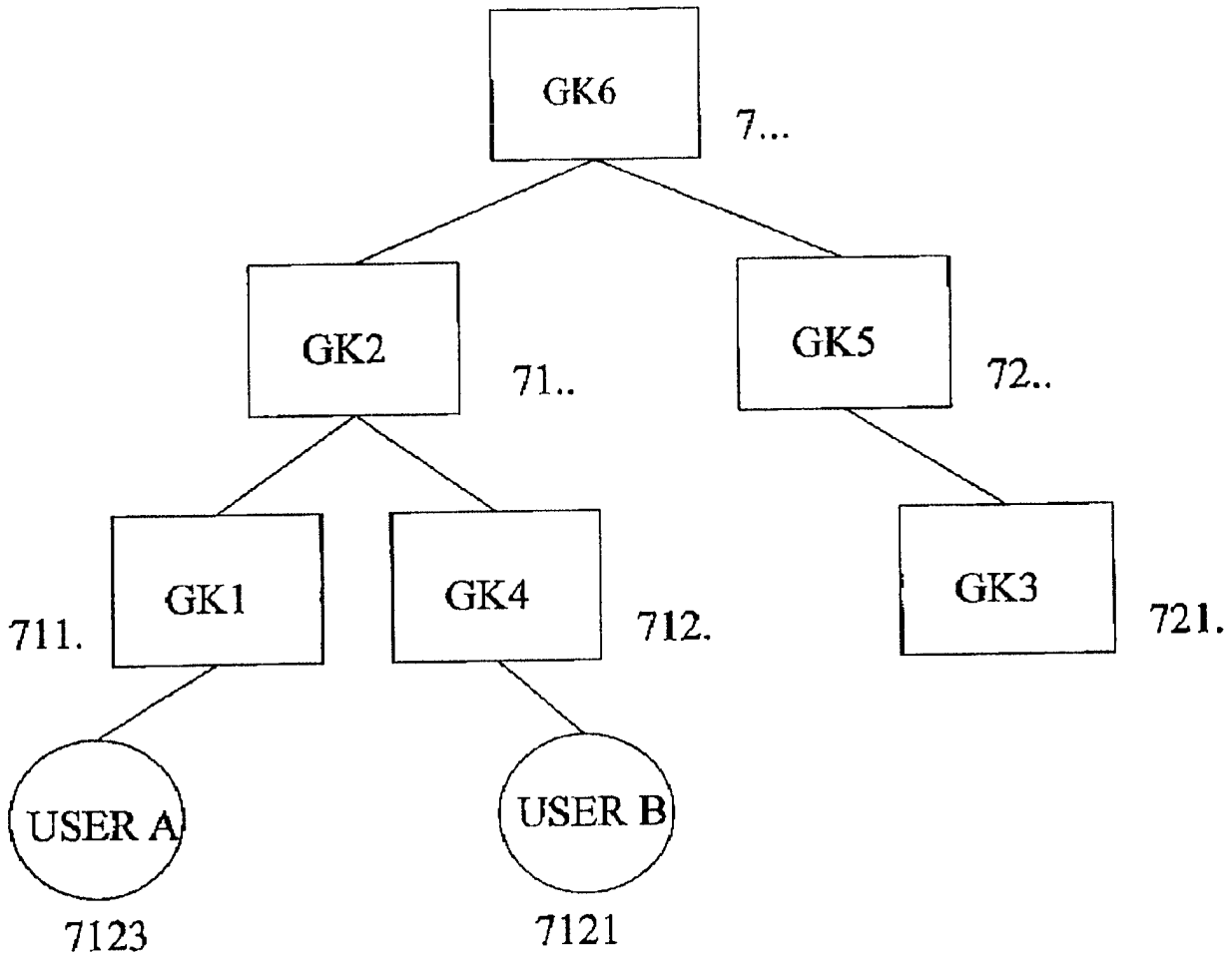

GK6
7...
GK2
71..
GK5
72..
GK1
711.
GK4
712.
GK3
721.
USER A
7123
USER B
7121

Figure 2

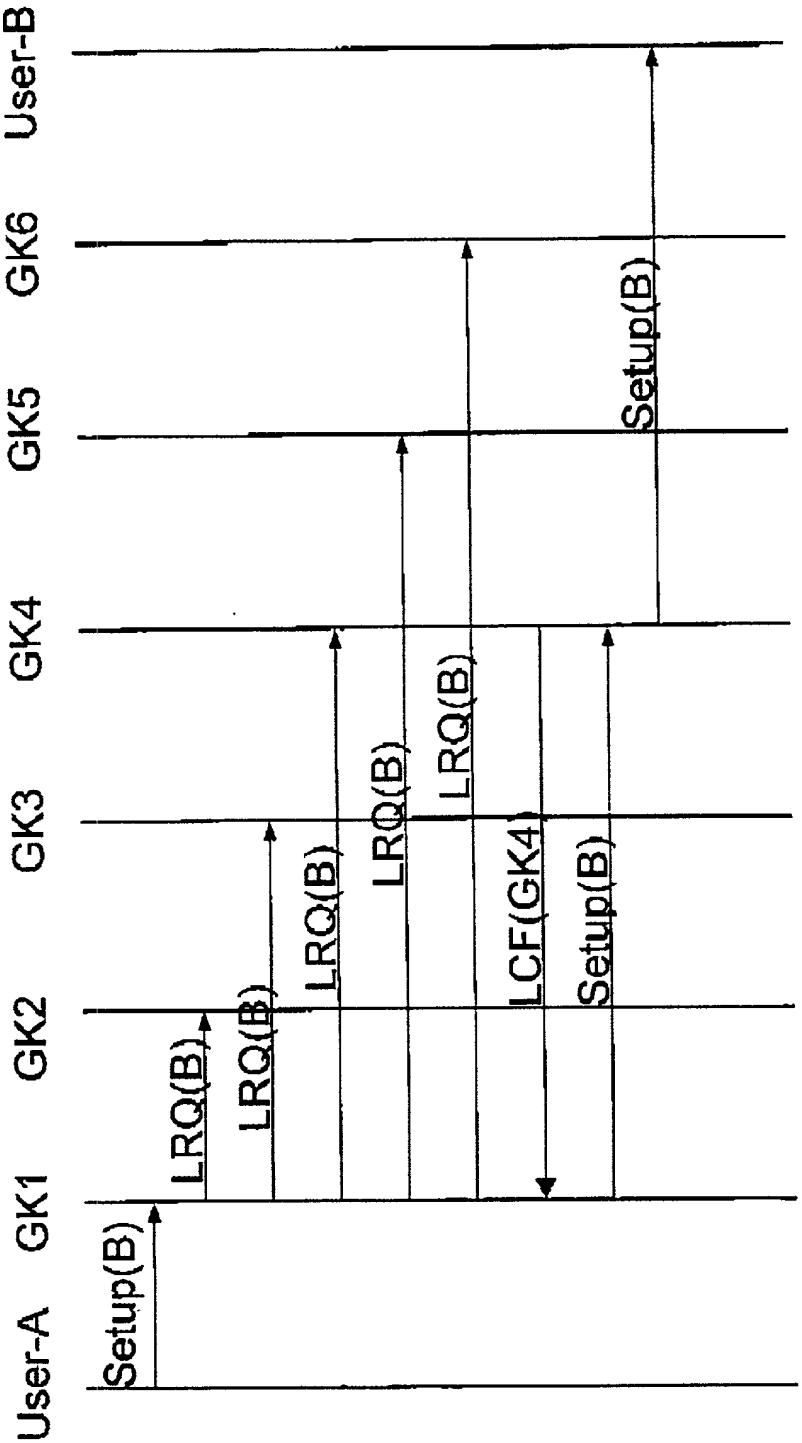

User-A
GK1
GK2
GK3
GK4
GK5
GK6
User-B
Setup(B)
LRQ(B)
LRQ(B)
LRQ(B)
LRQ(B)
LRQ(B)
LCF(GK4)
Setup(B)
Setup(B)

Figure 3

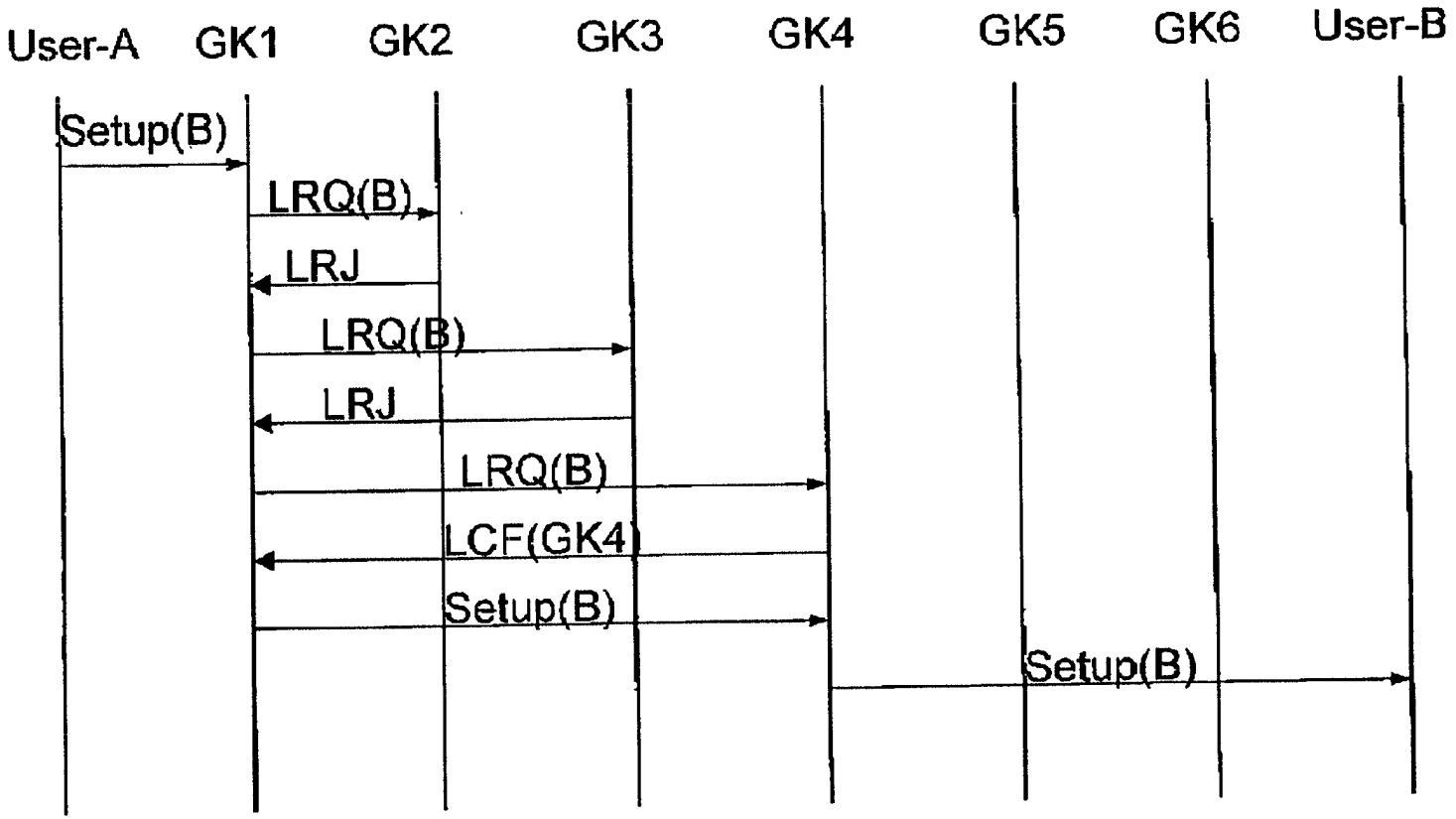

User-A
GK1
GK2
GK3
GK4
GK5
GK6
User-B
Setup(B)
LRQ(B)
LRJ
LRQ(B)
LRJ
LRQ(B)
LCF(GK4)
Setup(B)
Setup(B)

Figure 4

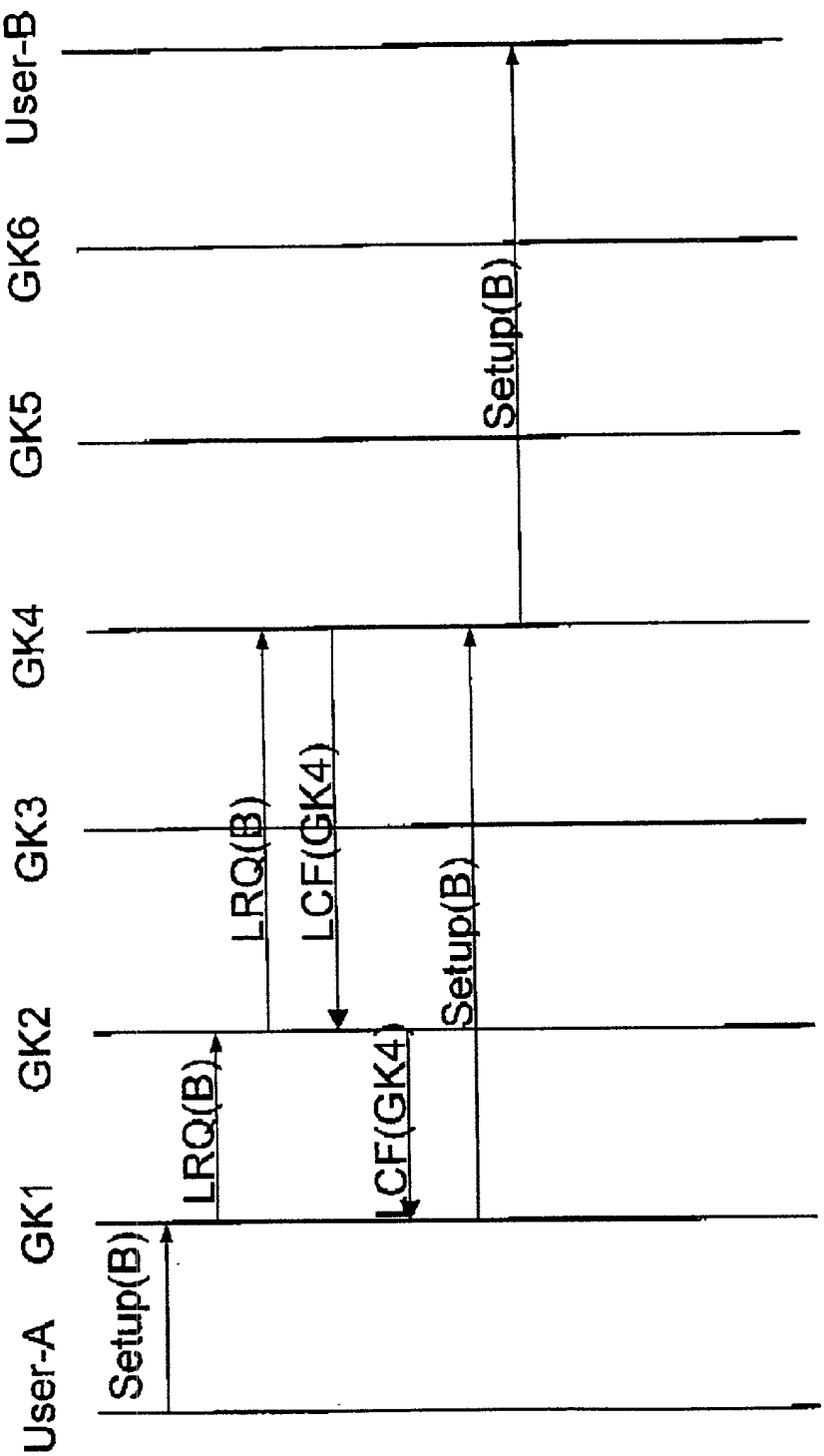
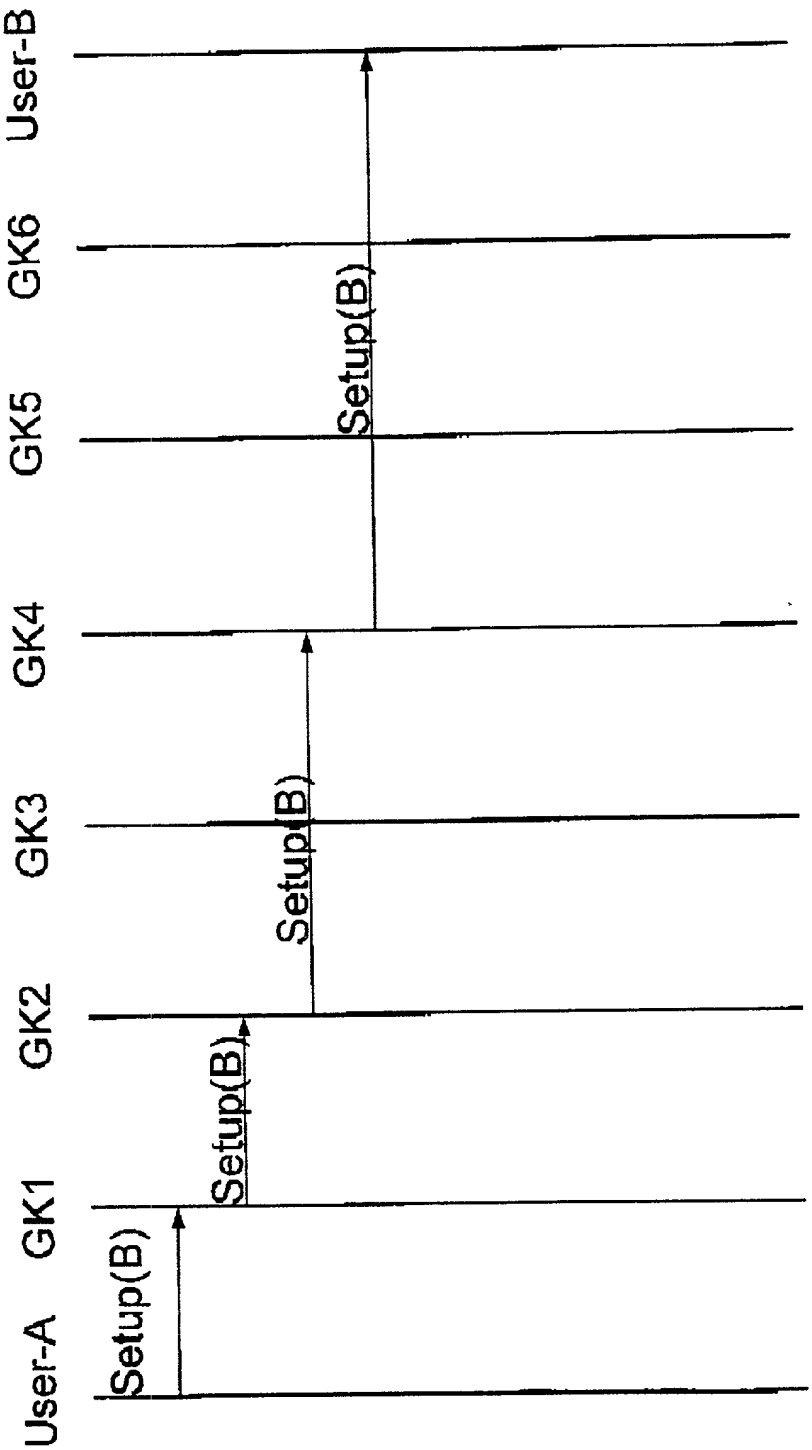

User-A
GK1
GK2
GK3
GK4
GK5
GK6
User-B
Setup(B)
LRQ(B)
LRQ(B)
LCF(GK4)
LCF(GK4)
Setup(B)
Setup(B)

Figure 5


User-A
GK1
GK2
GK3
GK4
GK5
GK6
User-B
Setup(B)
Setup(B)
Setup(B)
Setup(B)

Figur 6

PATENT APPLICATION
DOCKET NO.: 28170-00023
141635/OS/KR

RULES 63 AND 67 (37 C.F.R. 1.63 and 1.67)
DECLARATION AND POWER OF ATTORNEY

FOR UTILITY/DESIGN/CIP/PCT NATIONAL APPLICATIONS

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; and

I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **REDUCING SIGNALLING IN AN H.323 NETWORK BY ARRANGING GATEKEEPERS HIERARCHICALLY**, the specification of which: (mark only one)

X	(a)	is attached hereto.
__	(b)	was filed on _____ as Application Serial No. _____ and was amended on _____ (if applicable)
__	(c)	was filed as PCT International Application No. PCT/_____ on ____ and was amended on _____ (if applicable).
__	(d)	was filed on ___ as Application Serial No. ___ and was issued a Notice of Allowance on ___.
__	(e)	was filed on ___ and bearing attorney docket number ___

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above or as allowed as indicated above.

I acknowledge the duty to disclose all information known to me to be material to the patentability of this application as defined in 37 CFR § 1.56. If this is a continuation-in-part (CIP) application, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability of the application as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

I hereby claim foreign priority benefits under 35 U.S.C. § 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application

on which my priority is claimed or, (2) if no priority is claimed, before the filing date of this application:

PRIOR FOREIGN PATENTS

Number	Country	Month/Day/Year Filed	Date first laid-open or Published	Date patented or Granted	Prioity Claimed Yes	No
19994828	**Norway**	**04 Oct 1999**			X	

I hereby claim the benefit under 35 U.S.C. § 120/365 of any United States application(s) listed below and PCT international applications listed above or below:

PRIOR U.S. OR PCT APPLICATIONS

Application No. (series code/serial no.)	Month/Day/Year Filed	Status(pending, abandoned, patented)

NONE

I hereby appoint:

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HAROLD N. WELLS, Reg. No. 26,044
WILLIAM D. WIESE, Reg. No. 45,217

all of the firm of **JENKENS & GILCHRIST, a Professional Corporation**, 1445 Ross Avenue, Suite 3200, Dallas, Texas 75202-2799, as my attorneys and/or agents, with full power of substitution and revocation, to prosecute this application, provisionals thereof, continuations, continuations-in-part, divisionals, appeals, reissues, substitutions, and extensions thereof and to transact all business in the United States Patent and Trademark Office connected therewith, to appoint any individuals under an associate power of attorney and to file and prosecute any international patent application filed thereon before any international authorities, and I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization who/which first sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct them in writing to the contrary.

Please address all correspondence and direct all telephone calls to:

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Dallas, Texas 75202-2799
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214/855-4300 (fax)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAMED INVENTOR(S)

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	Guldbergs vei 27 N-0375 OSLO Norway **Post Office Address** (include zip code)		

2	Espen IVELAND **Full Name**	**Inventor's Signature**	**Date**
	Rings gate 6 N-3045 DRAMMEN Norway **Residence** (city, state, country)		Norwegian **Citizenship**
	Rings gate 6 N-3045 DRAMMEN Norway **Post Office Address** (include zip code)		